Message

From: Qian, Yaorong [qian.yaorong@epa.gov]
Sent: 5/19/2021 6:45:59 PM
To: Nguyen, Thuy [Nguyen.Thuy@epa.gov]
Subject: RE: Quick question

Hi Thuy,

The FTIR is a quick and convenient way to qualitatively detect the presence certain compounds in gas, liquid, or solid samples. The principle FTIR is to shing a light and then detect the transmission or reflection of the light at a specific wavelength. It is possible to detect and differentiate C-F bond, such as that in PFAS, from other bonds, such as C-H, C=O, C-O, etc. with FTIR, provided that the presence of C-F bond and other bonds are in high abundance. FTIR can be used to check the fluorination level of a fluorinated HDPE container, because the C-H bond of the polymers on the surface are pretty much replaced by C-F bond.

Because this technology only measures the frequencies and intensities of chemical bond vibrations, it can only differentiate bond types in high abundance. PFAS in the fluorinated containers are only present in trace levels. The majority of the fluorinated compounds are in polymer forms. In addition, it cannot differentiate chemical species, such different PFAS compounds. If PFAS are present in high amount, the FTIR will see the C-F bond frequency but cannot tell if it is PFAS or other fluorinated compounds or fluorinated polymers.

In pesticide products, PFAS, if present, are only in trace amount. FTIR will not be able pick up the signal of the C-F bond vibration. Other material (all the inerts and active ingredients) will overwhelm the FTIR spectra. So FTIR will not tell us if there is PFAS in pesticide products.

Thanks,

Yaorong

From: Nguyen, Thuy <Nguyen.Thuy@epa.gov>
Sent: Wednesday, May 19, 2021 11:59 AM
To: Qian, Yaorong <qian.yaorong@epa.gov>
Subject: RE: Quick question

Don't forget this
Thanks
Thuy

From: Qian, Yaorong <qian.yaorong@epa.gov>
Sent: Tuesday, May 18, 2021 4:22 PM
To: Nguyen, Thuy <Nguyen.Thuy@epa.gov>
Subject: RE: Quick question

Completely forgot.

From: Nguyen, Thuy <Nguyen.Thuy@epa.gov>
Sent: Tuesday, May 18, 2021 4:02 PM
To: Qian, Yaorong <qian.yaorong@epa.gov>
Subject: FW: Quick question

I forgot that we owe Clive an answer on FTIR

From: Davies, Clive <Davies.Clive@epa.gov>
Sent: Tuesday, May 11, 2021 9:49 AM
To: Nguyen, Thuy <Nguyen.Thuy@epa.gov>
Subject: RE: Quick question

Thank you, Thuy.

Here is the simple version. The bottom-line question is whether you think a FTIR spectrometers could be useful. Ex. 6 Personal Privacy (PP) Ex. 6 Personal Privacy (PP) uses FTIR to determine the level of fluorination in their products. We could use such a device just to get a presence/absence reading on cleaning product containers (and other relevant product types).

https://www.agilent.com/en/product/molecular-spectroscopy/ftir-spectroscopy/ftir-compact-portable-systems/4300-handheld-ftir

Also, do you think EPA might have such a device and would it be difficult to purchase one?

Clive

Clive Davies, P.E.
Safer Choice Program
202-564-3821

From: Nguyen, Thuy <Nguyen.Thuy@epa.gov>
Sent: Tuesday, May 11, 2021 9:30 AM
To: Davies, Clive <Davies.Clive@epa.gov>; Butler, Tristan <Butler.Tristan@epa.gov>
Cc: Larkin, Jenna <larkin.jenna@epa.gov>; Williams, Bridget <Williams.Bridget@epa.gov>; Wen, Chen <Wen.Chen@epa.gov>
Subject: RE: Quick question

Hi Clive/Tristan
Just letting you know I have been reading your e-mails and I will get back with you on your proposal/approach soon. We are so swamped now at the lab
Thanks
Thuy

From: Davies, Clive <Davies.Clive@epa.gov>
Sent: Monday, May 10, 2021 11:37 AM
To: Butler, Tristan <Butler.Tristan@epa.gov>
Cc: Nguyen, Thuy <Nguyen.Thuy@epa.gov>; Larkin, Jenna <larkin.jenna@epa.gov>; Williams, Bridget <Williams.Bridget@epa.gov>; Wen, Chen <Wen.Chen@epa.gov>
Subject: RE: Quick question

This may be a good path for us, Tristan. Thank you so much for inputting.

Thuy, could you please weigh in? Does the approach we are discussing make sense to you?

Do either of you know if the agency might possess portable FTIR spectrometers?

Clive

Clive Davies, P.E.

Safer Choice Program
202-564-3821

From: Butler, Tristan <Butler.Tristan@epa.gov>
Sent: Monday, May 10, 2021 11:34 AM
To: Davies, Clive <Davies.Clive@epa.gov>
Cc: Nguyen, Thuy <Nguyen.Thuy@epa.gov>; Larkin, Jenna <larkin.jenna@epa.gov>; Williams, Bridget <Williams.Bridget@epa.gov>; Wen, Chen <Wen.Chen@epa.gov>
Subject: RE: Quick question

This may be a better question for Thuy, but the only issue I foresee is that the cleaning products themselves may contain fluorinated species that could affect the measurement. I don't see this as a reason to not test these products, but something to keep in mind when analyzing the results.

From: Davies, Clive <Davies.Clive@epa.gov>
Sent: Monday, May 10, 2021 11:27 AM
To: Butler, Tristan <Butler.Tristan@epa.gov>
Cc: Nguyen, Thuy <Nguyen.Thuy@epa.gov>; Larkin, Jenna <larkin.jenna@epa.gov>; Williams, Bridget <Williams.Bridget@epa.gov>; Wen, Chen <Wen.Chen@epa.gov>
Subject: RE: Quick question

Thanks so much, Tristan.

Another question in follow-up.

We have heard from folks who make cleaning products that they do not use fluorinated containers. It seems like lubricants, solvents, brake fluid and items like that are more likely to be fluorinated.

So that we are doing a little due diligence rather than just taking it on faith, I thought we might be able to get one of these for us or for Thuy so we can scan a sampling of cleaning products.

Does this make sense, or there issues that are not occurring to me?

Clive

Clive Davies, P.E.
Safer Choice Program
202-564-3821

From: Butler, Tristan <Butler.Tristan@epa.gov>
Sent: Monday, May 10, 2021 11:21 AM
To: Davies, Clive <Davies.Clive@epa.gov>
Cc: Nguyen, Thuy <Nguyen.Thuy@epa.gov>; Larkin, Jenna <larkin.jenna@epa.gov>; Williams, Bridget <Williams.Bridget@epa.gov>; Wen, Chen <Wen.Chen@epa.gov>
Subject: RE: Quick question

Good Morning Clive,

I know that there are portable FTIR spectrometers which could be used to detect C-F bonds in HDPE. Ex. 6 Personal Privacy (PP) Ex. 6 Personal Privacy (PP) uses FTIR to determine the level of fluorination in their products, but I am not sure if these portable devices have the same sensitivity as traditional desktop FTIR instruments. Here is a link to such a portable device.

https://www.agilent.com/en/product/molecular-spectroscopy/ftir-spectroscopy/ftir-compact-portable-systems/4300-handheld-ftir

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From: Davies, Clive <Davies.Clive@epa.gov>
Sent: Monday, May 10, 2021 11:13 AM
To: Butler, Tristan <Butler.Tristan@epa.gov>
Cc: Nguyen, Thuy <Nguyen.Thuy@epa.gov>; Larkin, Jenna <larkin.jenna@epa.gov>; Williams, Bridget <Williams.Bridget@epa.gov>; Wen, Chen <Wen.Chen@epa.gov>
Subject: Quick question

HI Tristan. I hope this is a quick and easy question.

Do you know if there is such a thing as a portable instrument that could be used to determine whether fluorine is present in an HDPE polymer? So that you could quickly determine whether a plastic container has fluorine on a presence/absence basis?

Thanks so much.

Clive

Clive Davies, P.E.
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